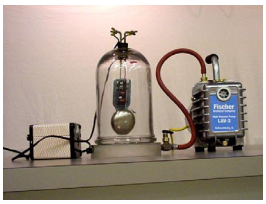
Activity #3—Student Lab Activity with Teacher Demonstration-Student Copy



Title: Transmission of Longitudinal (sound) Waves

Purpose: To develop an understanding that matter, in some form, is necessary for longitudinal (sound) waves to be propagated. If no matter is present (i.e., in a vacuum) with which to interact, energy transfer is impossible.

Materials: one coat hanger, one 75 cm string

Student Inquiry:

1.Formulate a hypothesis (drawing upon past experiences) that ranks the three common phases of matter (solid, liquid and gas) in increasing order as to their ability to carry longitudinal sound waves from the POOREST to the BEST.

2a. Were you able to hear the ticking of the watch when it was held about a meter from your ear?

2b. Describe what was heard when the sound of the ticking watch was allowed to travel through the metal rod to your ear.

3a. Describe the sound made by the suspended coat hanger (held in one hand by a string) when it was tapped by a pen or pencil.

3b. What phase of matter was carrying this sound to your ears?

3c. Describe what was heard when the coat hanger's sound was allowed travel through the string into your ears.

3d. What phase of matter was carrying this sound to your ears?

4a. List examples of sounds that reach your ears through substances OTHER than air.

4b. Now that you have made observations of sounds traveling through substances other than air, formulate a revised hypothesis, if necessary, that ranks the phases of matter from poorest to best as to their ability to conduct sound.

5. Predict what will happen to the volume of a sound source placed inside a bell jar attached to a vacuum pump as the air is removed.

6a. Predict what will happen to the volume of a sound source as air is allowed to re-enter the bell jar.

6b. Having observed the vacuum pump demonstration, offer an explanation as to how astronauts communicate with each other in the vacuum of outer space while working on Hubble Space Telescope repairs or other similar activities performed outside the space shuttles.